What is claimed is:

1. A bit rate agile communication system comprising:

a splitter receiving an input signal and splitting said input signal into a plurality of baseband signal streams;

a baseband signal processing network receiving said plurality of baseband signal streams and generating cross-correlated cascaded processed and filtered bit rate agile (BRA) in-phase and quadrature-phase baseband signals; and

a quadrature modulator receiving and quadrature modulating said cross-correlated filtered in-phase and quadrature-phase baseband signals to generate a quadrature modulated output signal.

2. The bit rate agile communication system in Claim 1, wherein said baseband signal processing network includes a cross-correlator and at least one bit rate agile cascaded mis-matched (ACM) modulator filter.

3. The bit rate agile system in Claim 1, further comprising:

a demodulator structure having at least one bit rate agile (BRA) cascaded mis-matched (ACM) demodulation filter which is mis-matched (MM) to said cascaded processed and filtered modulated signal, and operating to demodulate said bit rate agile signal.

4. The bit rate agile system in Claim 1, wherein said at least one processed and filtered baseband signal is generated by a plurality of modulator filters, and at least one bit rate agile (BRA) demodulator filter is used for signal demodulation.

5. The bit rate agile system in Claim 4, wherein said plurality of modulator filters, and said demodulator filter are connected in either serial, parallel, or a combination of serial and parallel topology.

6. In a communication system, a method for generating bit rate agile signals comprising steps of:

receiving an input signal and converting said input signal into a plurality of signal streams;

processing said plurality of signal streams to generate cross-correlated signals having changeable amounts of filtering for bit rate agile in-phase and quadrature-phase baseband signals; and

modulating said cross-correlated filtered in-phase and quadrature-phase baseband signals to generate a quadrature modulated bit rate agile output signal.

7. In a signal transmission system, a method for generating bit rate agile signals comprising steps of:

receiving a plurality of signal streams;

processing said plurality of signal streams to generate cascaded Time Constrained Signal (TCS) response and Long Response (LR) filtered in-phase and quadrature-phase baseband signals; and

modulating said Time Constrained Signal (TCS) response and Long Response (LR) filtered in-phase and quadrature-phase baseband signals to generate a quadrature modulated bit rate agile output signal.

8. A Bit Rate Agile (BRA) structure comprising:

a baseband signal processing circuit receiving one or more baseband signal streams and providing cross-correlated and filtered Bit Rate Agile (BRA) in-phase and quadrature-phase baseband signals;

a quadrature modulator serving to quadrature modulate said cross-correlated filtered in phase and quadrature phase baseband signals;

a transmit amplifier to provide said quadrature modulated signal to the transmission medium;

an interface receiver port to provide connection of the said cross-correlated filtered quadrature modulated signal to the demodulator; and

a demodulator structure to serve for Bit Rate Agile (BRA) signal demodulation.

9. A Bit Rate Agile (BRA) structure comprising:

a input port for receiving input data;

a splitter having an input coupled to said input port, and serving to split said input data into baseband signal streams;

a baseband signal processing network for receiving said baseband signal streams and providing cascaded Time Constrained Signal (TCS) response and Long Response (LR) filtered in phase and quadrature phase baseband signals;

a Quadrature Modulator serving to quadrature modulate said Time Constrained Signal (TCS) response and Long Response (LR) filtered in phase and quadrature phase baseband signals;

a transmit amplifier to provide said quadrature modulated signal to the transmission medium;

an interface receiver port to provide connection of the said filtered quadrature modulated signal to the demodulator; and

a demodulator structure to serve for Bit Rate Agile (BRA) signal demodulation.

10. A cross-correlated signal processor comprising:

(a) means for Bit Rate Agile (BRA), and Modulation-Demodulation(Modem) Format Selectable (MFS) input port for receiving input data;

(b) means for providing BRA and MFS in-phase (I) and quadrature phase (Q) signals;

(c) BRA and MFS means for cross-correlating a fraction of a symbol or one or more symbols of the I signal with one or more symbols of the Q signal;

(d) means for implementing the BRA and MFS cross-correlated signals by analog active circuits, analog passive circuits, by digital circuits or any combination thereof;

(e) means for switching in-out additional filters in the I and/or Q channels;

(f) means for Quadrature modulating the I and Q signals;

(g) means for Linear and/or Nonlinear amplification to provide to the antenna;

(h) a receiver port for connection of the received cross-correlated signal to the BRA and MFS demodulator;

(i) a BRA and MFS quadrature demodulator; and

(j) a Mis-Matched (MM) BRA and MFS demodulator filter set in which the said demodulator filter set is MM to that of the BRA and MFS filter set of the modulator.

11. A structure for trellis coding and decoding, of extended memory Bit Rate Agile (BRA), Modulation-Demodulation (Modem) Format Selectable (MFS) and Code Selectable (CS) input port for receiving input data comprising:

a trellis encoder;

a BRA, MFS and CS splitter having an input coupled to said input port, and serving to split said input data into baseband signal streams;

a BRA, MFS and CS baseband signal processing network for receiving said baseband signal streams and providing BRA, MFS and CS in phase (I) and quadrature (Q) phase baseband signals to the I and Q input ports of the transmitter;

means for baseband signal processing for receiving said baseband signal streams and providing for BRA, MFS and CS systems changeable amounts of cross-correlation;

means for selectively reducing the cross-correlating factor down to zero between Time Constrained Signal (TCS) response processors combined with TCS and Long Response (LR) processors;

a receiver port for connection of the received cross-correlated signal to the BRA and MFS demodulator;

a BRA and MFS quadrature demodulator; and

a Mis-Matched (MM) BRA and MFS demodulator filter set in which the said demodulator filter set is MM to that of the BRA and MFS filter set of the modulator.

12. A cross correlated quadrature architecture signal processor for producing Bit Rate Agile (BRA), cross-correlated in phase and quadrature phase signal streams for modulation by a Quadrature Modulator and transmission and for signal demodulation comprising:

(a) means for receiving an input BRA signal selected from the group of binary, multi-level, and analog signals and combinations thereof;

(b) filtering means of the BRA input signal;

(c) BRA signal shaping means for said filtered input signal;

(d) amplification means for varying the modulation index of said BRA signal, said amplifier receiving said filtered input signal and providing an amplified input signal;

(e) means for BRA signal splitting for receiving said amplified input signal;

(f) cross correlation means of BRA data streams; and a BRA signal processor means having an in phase and quadrature phase channel each receiving one of said cross-correlated data streams, each of said in phase and quadrature phase channel having a first delay gain filter, means for generating BRA Cosine and BRA Sine values for said in phase and quadrature phase channel data stream;

(g) a BRA wave shaper and a second BRA delay gain filter, such that said signal processor provides in phase and quadrature phase cross correlated data signal processor;

(h) means for quadrature modulation with a BRA modulated signal adaptable for coherent or non-coherent demodulation of the quadrature BRA Frequency Modulated (FM) signal;

(i) controlling means and signal selection means for BRA rate processor selection;

(j) selection means for Linear and/or Non-Linearly Amplified (NLA) baseband and/or of modulated signals coupling port means to the transmission medium;

(k) receiver port means for connection of one or more received cross-correlated signals to the BRA demodulator;

(l) BRA demodulator means; and

(m) Mis-Matched (MM) demodulator filtering means for BRA, MFS and CS demodulation in which the said demodulator filter set is MM to that of the BRA, MFS and BRA filter set of the modulator.

13. A signal processing, modulation, transmission, signal reception and demodulation system, designated as Feher's Gaussian Minimum Shift Keyed (GMSK) for Bit Rate Agile (BRA), Modulation Demodulation (Modem) Format Selectable (MFS) and Code Selectable (CS) systems comprising:

(a) input port for receiving input data;

(b) Gaussian low-pass filter and presetable gain integrator for processing said input data and providing filtered input data;

(c) a splitter having an input coupled to said input port, and serving to split said filtered input data into in phase (I) and quadrature phase (Q)channel cross coupled data streams such that said I and Q data streams are proportional in gain and phase to said

input data;

(d) a signal processing network for receiving said I and Q channel data streams and providing processed in phase and quadrature phase signals, said signal processing network including a signal processor for varying the modulation index for said signal processing network;

(e) means for generating Cosine and Sine values for said I and Q channel BRA, MFS and CS data streams;

(f) means for filtering by bit rate agile FIR or IIR or switched filter and/or other post GMSK shaping filters said signals in the I and Q channels such that said signal processor provides in phase and quadrature phase cross correlated data signals for quadrature modulation with a modulated signal suitable for amplification in linear and non-linear mode;

(g) means for providing the amplified signal to the transmission port;

(h) a receiver port for connection of the received cross-correlated signal to the BRA and MFS demodulator;

(i) a BRA and MFS quadrature demodulator; and

(j) a Mis-Matched (MM) BRA and MFS demodulator filter set in which the said demodulator filter set is MM to that of the BRA and MFS filter set of the modulator.

14. A structure comprising:

a input port for receiving Orthogonal Frequency Division Multiplexed (OFDM) baseband signals; and

a baseband signal processing network for receiving said OFDM signals and providing cross-correlated filtered in-phase and quadrature-phase baseband signals.

15. A structure comprising:

a input port for receiving Orthogonal Frequency Division Multiplexed (OFDM) baseband signals; and

a baseband signal processing network for receiving said OFDM signals and providing cross-correlated Peak Limited (PL) in-phase and quadrature-phase baseband signals.

16. A structure comprising:

an input port for receiving baseband signals;

a baseband signal processing network for receiving said baseband signals and providing more than two state cross-correlated filtered in-phase and quadrature-phase baseband signals;

a Quadrature Modulator serving to quadrature modulate said cross-correlated filtered in-phase and quadrature-phase baseband signals; and

a transmit amplifier to provide said quadrature modulated signal to the transmission medium.

17. A structure comprising:

a input port for receiving a plurality of baseband signals;

a baseband signal processing network for receiving said plurality of baseband signals and providing cross-correlated filtered in-phase and quadrature-phase baseband signals to two or more quadrature modulators for quadrature modulation;

a set of two or more transmit amplifiers to amplify and provide said quadrature modulated signals for RF combining; and

a combiner device for RF combining of said quadrature modulated amplified signals.

18. A structure comprising:

a input port for receiving a plurality of baseband signals;

a baseband signal processing network for receiving said plurality of baseband signals and providing in-phase and quadrature-phase filtered baseband signals to two or more quadrature modulators for quadrature modulation; and

a set of two or more transmit amplifiers to amplify and couple said quadrature modulated amplified signals to two or more antennas.

19. A structure comprising:

a input port for receiving baseband signals;

a baseband signal processing network for receiving and splitting said signals and for providing cross-correlated filtered in-phase and quadrature-phase baseband signals to

two or more quadrature modulators for quadrature modulation; and

a set of two or more transmit amplifiers to amplify and provide said quadrature modulated amplified RF signals to an antenna array.

20. A structure comprising:

a signal processing network for receiving and splitting signals and for providing cascaded Time Constrained Signal (TCS) response and Long Response(LR) filtered in-phase and quadrature-phase baseband signals to two or more quadrature modulators for quadrature modulation;

a set of two or more transmit amplifiers to amplify and provide said quadrature modulated amplified RF signals for RF combining; and

a combiner device for RF combining of said quadrature modulated amplified signals.